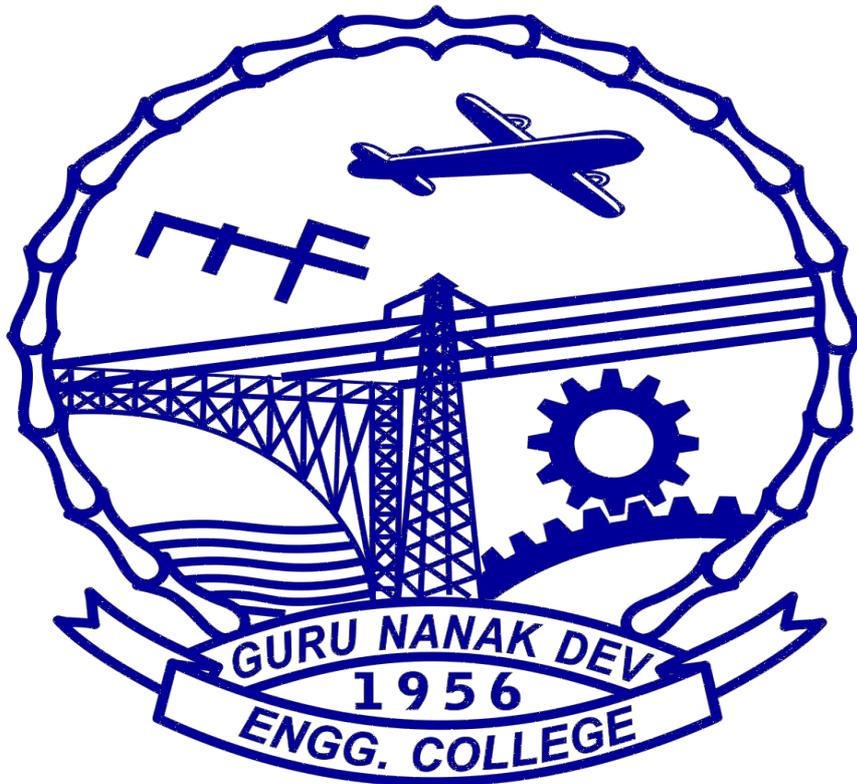


**Course outcomes
Of
B.Tech Production Engineering
2014 onwards**



Guru Nanak Dev Engineering College

(An Autonomous College U/S [2(f) and 12 (B) of UGC Act 1956)

NBA Accredited Programmes under Tier-I (Washington Accord), 'A' Grade NAAC Accredited, TCS Accredited AICTE Approved, Punjab Govt. Aided Status, Affiliated to I.K. Gujral Punjab Tech. University, ISO : 9001:2008 Certified

Third Semester

Subject name and code	Course outcomes
<p style="text-align: center;">Strength of Materials (PE - 14301)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Execute the fundamental concepts of stress, strain and elastic behavior of materials to analyse structural members subjected to tension, compression, and torsion. 2. Analyze the bending stress on different types of sections. 3. Formulate appropriate theoretical basis for the analysis of combined axial and bending stresses. 4. Understand the behavior of column and struts under axial loading. 5. Demonstrate the use of critical thinking and problem solving techniques as applied to structural systems. 6. Predict the deflection in beams of varying sections and different materials.
<p style="text-align: center;">Machine Drawing (PE - 14302)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. The course studied enables the students to read, draw and interpret the entities being drawn in the course. 2. The knowledge gained streamlined the drafting skills of the students. 3. The course studied enables the student for drafting a new component in industrial applications. 4. The studied course increases the ability to suggest the required manufacturing process and methods for material saving. 5. Understand the concept of limits, fits and tolerances in various mating parts. 6. Visualize and generate different views of a component with detailed internal information in the assembly and disassembly.
<p style="text-align: center;">Thermal Engineering (PE - 14303)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Recall various laws, equations and methods that can be applied in various thermal system 2. Identify, track and solve various heat transfer and combustion related problems. 3. Recognize and understand the working of devices involved in steam power generation system. 4. Evaluate the performance of various components involved in boilers, internal combustion engines, steam power plants and reciprocating compression machines. 5. Assess the working and benefits of using non-conventional sources of energy. 6. Design components of reciprocating compression machines, refrigeration systems.

<p style="text-align: center;">Theory of Machines (PE - 14304)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the working of various primitive components of a machine. 2. Develop mathematical skills for the computation of industry related problems. 3. Determine the various physical parameters of power transmission devices, friction devices and different governing devices. 4. Compute the essential parameters like fluctuation of speed and energy in a flywheel of a vehicle, slotting machine etc. 5. Understand the complete (translational and rotational) mechanism of Velocity and acceleration and do analysis. 6. Understand the function of belt drives, cams, flywheels and governors and solve related problems.
<p style="text-align: center;">Manufacturing Process –I (PE - 14305)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. The subject makes the students aware of fundamental principles about casting and welding processes so as to apply these principles for studying the processes. 2. Students are able to identify various equipments and accessories required for performing the casting and welding processes. 3. Students are able to demonstrate and guide the technicians for successful conduct of casting and welding processes in industrial applications. 4. The subjects are able to create the ability to test the products made by casting and welding processes so as to appreciate their utility in industrial applications. 5. Suggest a suitable process for manufacturing of components 6. Understand the latest technologies in Casting and Welding Processes.
<p style="text-align: center;">Strength of Materials Lab (PE - 14306)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. The subject makes the students able to execute the fundamental concepts of stress, strain and elastic behaviour of materials to analyse structural members subjected to tension, compression and torsion. 2. Analyze Execute the fundamental concepts of stress, strain and elastic behaviour of materials to analyse structural members subjected to tension, compression and torsion. 3. Perform torsion test and determine modulus of rigidity. 4. Understand the behaviour of column and struts under axial loading. 5. Perform shear test and determine ultimate shear strength. 6. Perform shear test and determine ultimate shear strength.

<p style="text-align: center;">Thermal Engineering Lab (PE- 14307)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. An ability to identify, track various combustion problems in I.C. engines. 2. An ability to recognize and understand the working of devices operating on the principles of Heat Transfer. 3. Evaluate practically the performance of various components involved in steam power plants and reciprocating compression machines. 4. Design some components working on non-conventional power sources. 5. An ability determine the C.O.P. of various machines like refrigerator, air conditioner etc. 6. An ability to understand and interpret the working of various industrial boilers.
<p style="text-align: center;">Theory of Machines Lab (PE- 14308)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Conceptualize the function and applications of kinematic chains, mechanisms. 2. Understand the role of materials/type of belt in reducing coefficient of friction. 3. Understand the role and applications of various gears. 4. Analyze cam profile. 5. Understand function of gear trains. 6. Understand the function of governors and flywheels.
<p style="text-align: center;">Manufacturing Processes-I Lab (PE- 14309)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Conduct various tests and to determine major characteristics of moulding sand. 2. Determine clay content and moisture content in a moulding sand. 3. Design of riser and gating system for casting 4. Use the equipment required in various welding processes (like TIG MIG, Spot/Seam, welding) 5. Understand the effect of various process parameters on weld quality. 6. Make lap, Butt, T-joints etc. with different welding processes.

Fourth Semester

Subject name and code	Course outcomes
<p style="text-align: center;">Design of Machine Elements (PE - 14401)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the design flow chart for existing and new conceptual design. 2. Students will be able to understand and make proper assumptions with respect to material, factor of safety, static and dynamic loads for various machine components. 3. Apply the various theories of failure on the machine elements and determine on what conditions the element fails or do not fails. 4. Be able to analyze the stress and strain on mechanical components; and understand, identify and quantify failure modes for mechanical parts. 5. Deal with the machine design problems in technical way using design principles and procedures. 6. Acquire skill in preparing production drawings (Manually /computerised) pertaining to various designs.
<p style="text-align: center;">Fluid Mechanics & Fluid Machinery (PE - 14402)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Use the basic laws and formulae related to fluid properties. 2. Operate and handle various machines working on fluid power. 3. Solve problems relating to kinematic and dynamics of fluid flow. 4. Analyze the fluid dynamic conditions and assess the equations involved fluidic systems on the basis of dimensional homogeneity and fluid properties 5. Develop the capability to evaluate the process parameters of fluid machinery and equipment. 6. Design new fluid power systems and modify the existing results to get useful outcomes.
<p style="text-align: center;">Manufacturing Processes-II (PE - 14403)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Learn the various machining processes for manufacturing. 2. Understand the various process parameters involved in machining processes. 3. Implement appropriate machining processes effectively and economically. 4. Analyze various work specifications for economic machining of components. 5. Evaluate the various process parameters (cutting speed, feed, and depth of cut and machining time) in different machining processes. 6. Design newer combinations of different processes of machining, machining parameters, tool material and tool

	shape to enhance the tool life.
Engineering Materials & Metallurgy (PE - 14404)	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the significance of the metallurgical characteristics of engineering materials (both ferrous and nonferrous). 2. Explain the use and significance of various heat treatment processes and their applications for different materials. 3. Evaluate the defects in materials and their reasons. 4. Understand various failure phenomenon in materials. 5. Understand the structural changes in metals with respect to time temperature transformations. 6. Understand the role of Fe-C and TTT diagram for controlling the desired structure and properties of the materials.
Industrial Organization & Management (PE - 14405)	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand types of business organization and concepts of industrial Psychology. 2. Act as the supervisor and leader in Industrial Environment. 3. Plan and organize the basic Industrial activities. 4. Understand the modern management concepts like MBO, Management functions, scientific management 5. To implement the various plans and theories of MIS with business plans, Project Planning etc. 6. Apply Effective Leadership techniques in industry.
Design of Machine Elements Practice (PE - 14406)	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the design flow chart for existing and new conceptual design. 2. Deal with the machine design problems in technical way using design principles and procedures. 3. Understand different stresses and strains (loading conditions), and also effect of these stresses and strains on different machine members. 4. Deal with problems of designing various types of joints and other important machine elements in a technical way. 5. Will be able to analyze the design and recommend/apply appropriate adjustments in the existing design. 6. Manage Design of machine components like: springs, flywheel, clutches and brakes etc. according to various necessities in the business/Industry.

<p style="text-align: center;">Fluid Mechanics & Fluid Machinery Lab (PE - 14407)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Solve problems relating to kinematic and dynamics of fluid flow. 2. Analyze the fluid dynamic conditions and in assessing the equations involved on the basis of dimensional homogeneity. 3. Evaluate theoretically the performance of various components involved in pumps and turbines. 4. Evaluate the various flow losses. 5. Check the homogeneity of various equations involved in fluid mechanics. 6. Solve various problems arising in fluid working machinery.
<p style="text-align: center;">Manufacturing Processes -II Lab (PE - 14408)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Prepare detailed working sketches describing constructional features of various machines 2. Study and apply the lubrication system in the machine tools. 3. Perform advanced exercises on Lathe within specified tolerances, cutting of V-threads and square threads etc. 4. Perform exercises on milling machines; generation of plane surfaces, production of spur gears and helical involute gears, use of end mill cutters. 5. Regrind and manufacture single point cutting tool, cutters and drills. 6. Design mechanisms for the required job on a machine.
<p style="text-align: center;">Engineering Materials & Metallurgy Lab (PE - 14409)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Study different Engineering materials and their Mechanical properties. 2. Predict microstructures of the different materials and alloys. 3. Evaluate different phases of materials from Iron carbon diagram. 4. Understand various heat treatment processes and their effects. 5. Perform the processes like Annealing, Normalizing, tempering of steel components. 6. Study and construct the T-T-T diagram for steels.

Fifth Semester

Subject name and code	Course outcomes
<p align="center">Operations Research (PE - 14501)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Analyze and understand the basics of operation research. 2. Formulate the mathematical models of industrial/service/defense/government problems for analyzing them for finding the alternative solutions. 3. Analyze the mathematical models by different linear programming models for evaluating the solutions of existing problems of industrial/service/defense/government sectors. 4. Design, plan and evaluate the duration, scheduling and progress of new and existing projects of industrial/service/defense/government sectors 5. Plan and evaluate the transportation and scheduling polices and cost based on mathematical models. 6. Plan and evaluate the queueing systems of industrial, toll plazas, roads, malls functions and other services based on mathematical evidences.
<p align="center">Machining Science (PE - 14502)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand tool geometry of the basic cutting tools like single point cutting tool, drills etc. 2. Apply fundamentals of mechanics of the machining process using an analytical approach. 3. Use technical approach in solving problems related with the measurement of cutting forces, tool wear and tool life. 4. Analyse major improvements in tool design, tool materials and machining techniques. 5. Evaluating numerical problems for different machining conditions. 6. Design various tools on the basis of their geometry and material.
<p align="center">Engineering Metrology (PE - 14503)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. The concepts in modern engineering plant with different shops like Tool Room, Machine Shop, Press Shop, Plastic Shop, Pressure Die Casting Shop, Electroplating and painting Shop, and Assembly Shop. 2. In the Research, Development, and Engineering department also. 3. Various standard equipments which are used to calibrate other working standards. 4. Students can also contribute in the development of new

	<p>standards.</p> <ol style="list-style-type: none"> 5. Acquire the competence in sensors, transducers and terminating devices with associated parameters 6. Analyze the basic principles and devices involved in measuring surface textures.
<p>Metal Forming (PE –14504)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Combine the theory of metal forming with the actual processes in the industry. 2. Predict better lubricants for various metal forming processes. 3. Understand the state of stress in various metal forming processes. 4. Associate rules by using different analytical methods such as finite element analysis, upper bound method. 5. Modify the operations involved in various metal forming processes 6. Assess the outcomes of different processes used in industry.
<p>Machining Science Lab (PE - 14505)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Prepare a HSS single point cutting tool of given tool signature. 2. Measure the cutting forces in all directions and calculate various parameters. 3. Use the drill dynamometers to measure the torque, and thrust in Drilling operation. 4. Work with tool work thermocouple in order to measure the tool chip interface temp and determine chip reduction coefficient in turning. 5. Determine Taylor Tool life exponents by Facing test. 6. Study the effect of cutting variables on surface finish in any cutting operation
<p>Engineering Metrology Lab (PE – 14506)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Measure the surface roughness of the given workpiece. 2. Measure the taper angle by using sine bar & slip gauges. 3. Measure the various gear tooth profile parameters. 4. Perform the machine tool alignment test on lathe and radial drilling machine. 5. Check the flatness of surface plate by Auto-collimator. 6. Find out the strain in a given workpiece under given loading by using strain gauges. Calibration of pressure gauge.
<p>Metal Forming Lab (PE – 14507)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Study of the effect of clearance and shear angle on the blanking and piercing operations. 2. Determine the effect of percentage of reduction and the semi-cone angle of the die on the drawing load. 3. Calculate percentage of reduction and the die geometry on extruding force. 4. Experimentally determine the coefficient of friction for metal forming processes.

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| | <ol style="list-style-type: none">5. Evaluate the parameters like flowability, forging load etc by plasticine model.6. Calculate roll load in the sheet rolling process. |
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Sixth Semester

Subject name and code	Course outcomes
<p style="text-align: center;">Industrial Engineering (PE - 14601)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the basic of Industrial Engineering and its techniques 2. Design and develop the job conditions requirements and promotional polices 3. Analyse the basic process and techniques of working environment and methods 4. Analyze the Work Measurement Techniques 5. Design and modify of a plant/organization and value of a new and existing product 6. Design, analyse and develop different products based on human needs and comfort and working conditions of a new job
<p style="text-align: center;">Product Design & Development (PE - 14602)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Awareness of the elements and principles in creating successful visual compositions. 2. Determination of design consideration like shape mass, unity and variety. 3. Principles of graphic design balance, proximity, alignment, repetition and contrast. 4. Temporary and permanent joints and plastic products. 5. Acquire the specific knowledge from other courses through practice and reflection in an action-oriented setting. 6. Create and Design the new product working in group sessions and teams to become acquainted with the importance of teamwork and collaboration.
<p style="text-align: center;">Tool and Cutter Design (PE - 14603)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Identify cutting tool elements of single point and multipoint cutting tools 2. Select suitable machining process for suitable materials and select optimum parameters for the Cutting tools. 3. Solve Machining time, MRR, Power required for various machining processes. 4. Analyze tool wear conditions/mechanism w.r.t cutting tool parameters. 5. Design elements and geometrical parameters of the tool point. 6. Develop Single, Multipoint and Form cutting tools according to tool signature.

<p style="text-align: center;">Non Traditional Machining (PE - 14604)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Differentiate between traditional machining processes and the modern machining processes 2. Use the technologies to machine difficult-to-machine materials, such as metal matrix composites, monolithic and composite ceramics, aluminates, and high performance polymers 3. Interpret Material removal mechanisms and material removal rates in different processes. 4. Outline and solve the regular problems with traditional machining processes. 5. Develop new setups for machining for changes demands of the industry. 6. Apply nontraditional machining process in industry.
<p style="text-align: center;">Industrial Engineering Lab (PE - 14605)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Determine standard time for a given job using stopwatch time study. 2. Prepare flow process chart, operation process chart and man-machine charts. 3. Study existing layout of a workstation with respect to controls and displays and suggesting improved design from ergonomic view point. 4. Carry out a work sampling study in selected industry. 5. Design a sampling scheme based on OC curve. 6. Apply skills in industry in future.
<p style="text-align: center;">Product Design And Development Lab (PE - 14606)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Study the product design message of the commonly used product and use them to define the product message for selected product 2. Conceptualize process and implement it to the selected product in the design exercise. 3. Apply the principles of visual design forth detailed design of the selected product. 4. Develop the product detailing for the selected product. 5. Develop/select the manufacturing process and material for the product considering cost as the major parameters. 6. Apply principles of graphic design to the product.
<p style="text-align: center;">Tool and Cutter Design Lab (PE-14607)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand tool signature of single point cutting tool. 2. Prepare the single point cutting tool using tool and cutter grinder. 3. Study the effect of chip breaker on chip reduction coefficient 4. Prepare the twist drill using conventional machining process. 5. Prepare profile shaped plain milling cutter and understand process parameters in Up/down milling with conventional workplace material. 6. Design broach for external/internal holes and perform parametric optimization for given jobs calculate roll load in the sheet rolling process.

Seventh Semester

Subject name and code	Course outcomes
<p align="center">Computer Integrated Manufacturing (PE - 14701)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand working of different computer graphics systems. 2. Enables students to improve their skills on manufacturing with computers. 3. Enhance the knowledge regarding the manufacturing aspects of the machining. 4. Develop programme for inventory management using MRP –II 5. Group technology and computer aided process planning will help in planning the various schedules employed in an industrial set up. 6. Create programme by using APT language for different handling processes.
<p align="center">Machine Tool Design (PE - 14702)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the basic nomenclature for M/C tool designing and applications. 2. Build mechanism for designing SPM. 3. Analyze the basic operations of M/C tools. 4. Develop speed box and feed box for M/C tools. 5. Acquire the basic usage of kinematic structures and M/C tool drives for developing customer specific M/C tool. 6. Create and design speed/ feed box with single speed motor for dynamic M/C tool applications using contemporary development tools like speed chart, ray diagram, gearing diagram etc.
<p align="center">Industrial Automation and Robotics (PE - 14703)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Recognize the Concept, need and application of automation to the industry. 2. Understand the constructional features, working and use of different fluid power controls for automation. 3. Implement the different working characteristics of fluidic elements for industrial operations. 4. Analyze the basic robot terminology for practical applications. 5. Evaluate the detail and application of different transfer devices and feeders in manufacturing Processes. 6. Create and design the pneumatic and hydraulic circuits for industrial automation applications.
<p align="center">Industrial Tribology (PE-14704)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Co-relate the theoretical concept of Tribology with the actual processes in industry. 2. understand different laws of wear & measurement of wear in various environmental conditions. 3. Suggest better lubricants to be used depending upon the environment conditions. 4. Understand the prevention and control of wear and friction by using different mechanisms of lubrication. 5. Enhance the knowledge of different laws of wear and measurement of the same practically in various environmental conditions.

	<ol style="list-style-type: none"> Understand the designing of bearings with respect to clearance required, minimum film thickness etc.
<p>Industrial Automation And Robotics Lab (PE – 14705)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> Design an assembly of hydraulic / pneumatic circuit. Study power steering mechanism used in automobiles Study reciprocating movement of double acting cylinder using pneumatic direction control valves Use direction control valve and pressure control valves clamping devices for jig and fixture. Understand and modify the motion of robotic end effectors. Use different types of hydraulic and pneumatic valves in various machines.
<p>Computer Integrated Manufacturing (Lab) (PE- 14706)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> Understand NC coordinate systems and develop programme for different operations. Write programme by using APT language. Develop programme for inventory management using MRP –II. Understand and apply optical and non-optical computer aided testing techniques. Study and understand flexible manufacturing systems. Work with DNC systems effectively in an organization.
<p>Machine Tool Design Lab (PE- 14707)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> Construct kinematics diagrams of the various machines CAD software Understand Gearing diagrams of the different kinds of machines. Determine number of teeth on gears using speed chart, ray diagram and gearing diagram. Construct speed chart, ray diagram and gearing diagram. Use appropriate mechanism for required application. Design beds and columns for different kind of machine tools.
<p>Industrial Tribology Lab (PE- 14708)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> Use Pin on Disk apparatus to know the tribological properties of various materials under different environmental conditions. Use Air-Jet Erosion tester apparatus to know the tribological properties of various materials under different environmental conditions. Use Slurry Erosion tester apparatus to know the tribological properties of various materials under different environmental conditions Study the erosive wear of different materials (MS, Cu, Brass and CI) by varying the different parameters. Study the wear, coefficient of friction, friction force, weight loss on different materials (MS, Cu, Brass and CI) under dry and lubricated conditions. Calculate the wear rate under different temperature conditions.

Course Outcomes of Department Elective Subjects:

GROUP-I (ELECTIVES)

Subject name and code	Course outcomes
Industrial Finishing Technology (DEPE-14901)	Students will be able to: <ol style="list-style-type: none">1. Choose technology used for final finishing of parts manufactured.2. Understand of mechanical, chemical, electrochemical and advanced finishing operations used for manufacturing of products.3. Effectively use appropriate coatings whichever required depending on environmental conditions.4. Acquire complete knowledge of principles and types of coatings.5. Prevent the rusting of parts using various coatings.6. Work in field of life enhancement of manufactured parts.
Welding Technology (DEPE-14902)	Students will be able to: <ol style="list-style-type: none">1. Analyze the thermal aspects during welding and their role on quality of weldment.2. Analyze the welding process behavior for common and newer welding techniques3. Understand requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials.4. Understand metallurgical changes in the weld metal and its effect on material properties.5. Explain the metal transfer process during welding and power resources used for welding.6. Work with advanced welding techniques for effective weldments.
Plastic and ceramic technology (DEPE-14903)	Students will be able to: <ol style="list-style-type: none">1. Differentiate various types of plastics and their selection for different applications.2. Polymer processing and joining using various techniques.3. Design moulded products and avoiding wrapage of moulded products.4. Work on the casting of various polymers.5. Explain ceramic and non-ceramic phases in ceramic processing6. Understand the standard tolerances for moulded articles.
Non-Destructive testing (DEPE-14904)	Students will be able to: <ol style="list-style-type: none">1. Understand and recognize various non-destructive testing methods for testing of engineering products.2. Use NDT methods for detecting flaws in specimen.3. Suggest suitable NDT technique for engineered product.4. Understand the role and benefit of NDT for improving the quality of product.5. Understand the concept of photo elasticity.6. Explain the pros and cons of NDT methods.

<p>Material Handling and Plant Layout (DEPE-14905)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Describe and determine the effect of product, process, and schedule design parameters on plant layout and materials handling systems design. 2. Identify the characteristics of product and process layouts and their needs in terms of materials handling. 3. Develop and analyze plant layouts using manual and computer aided software methodologies. 4. Identify and select various types of material handling equipment. 5. Design material handling systems for a variety of scenarios pertaining to manufacturing and service industry. 6. Generate the plant layouts using various methods.
<p>Supply chain management (DEPE-14906)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Develop comprehensive strategic and tactical supply chain for an organization. 2. Assess supply chain plans and practices from the viewpoint of sustainability. 3. Evaluate the risk associated with various supply chain practices. 4. Appraise the importance of the design and redesign of a supply chain as key components of an organization's strategic plan. 5. Strengthen integrative management analytical and problem-solving skills. 6. Develop an in-depth understanding of logistics operating areas and their interrelationship.
<p>Applied elasticity and Plasticity (DEPE-14907)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the stress, strain, torsion and bending properties. 2. Apply the concepts of stress, strain, torsion and bending and deflection of bar and beam in engineering field 3. Relates the basic theory of elasticity and plasticity with application of solid mechanics. 4. Understand how the stress-strain characteristics affect ultimate failure of materials. 5. Able to relate theory of plasticity to design tooling in manufacturing instead of using 'thumb rule'. 6. Examine different yield criteria in diverse failure situations.
<p>Productivity Management (DEPE-14908)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the importance and contributions by Kaizen, Just-In-Time, and Total Quality Management to productivity, including the problems in their implementation. 2. Design the productivity improvement program for an organization. 3. Evaluate productivity of an organization using various evaluation models. 4. Apply different planning models for improving productivity. 5. Evaluate and manage productivity of an industry, conduct risk assessment and apply risk control. 6. Identify distinguishing features of company's productivity.

GROUP-II (ELECTIVES)

Subject name and code	Course outcomes
Marketing & Financial management (DEPE-14909)	Students will be able to: <ol style="list-style-type: none">1. Introduce the concept of marketing mix as framework for marketing decision making2. Emphasis the need, importance & process of marketing planning & control3. Understand the dynamic nature of marketing function.4. Apply various tool & techniques in areas of financial management.5. Understand various concept related to financial management.6. Develop analytical skills this would facilitate the decision making in business situations.
Modeling & Simulation DEPE-14910)	Students will be able to: <ol style="list-style-type: none">1. Understand the techniques of modeling in the context of hierarchy of knowledge about a system.2. Develop the capability to apply the same to study systems through available software.3. Learn different types of simulation techniques.4. Learn to simulate the models for the purpose of optimum control by using software.5. Explain Verification and Validation of simulation model.6. Understand the concept of analog computer simulation and can formulate a model for dynamic system.
Estimating & Costing (DEPE-14911)	Students will be able to: <ol style="list-style-type: none">1. Learn about various costs for manufacturing product and estimate the cost of product.2. Develop good remunerating systems in an organization.3. Explain overhead, standard and marginal costing in detail.4. Control the capital expenditure in a business organization.5. Perform import export activities with the knowledge of EXIM policies.6. Set a price of a new product using pricing process.
Value Engineering (DEPE-14912)	Students will be able to: <ol style="list-style-type: none">1. Understand the basic of VE to ensure that a standardize method is used for VE application.2. Perform function analysis for building project.3. Understand the appropriate time to apply VE for design projects.4. Apply VE as a economic analysis tools.5. Apply SMART methodology in group decision environment.6. Find application of all areas in day to day life.

<p>Automobile Engineering (DEPE-14913)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand about the basic structure, chassis and suspension, application of automobile engineering in industry and field and awareness of the terminology and inventory related to automobiles. 2. Understand the working and description of power unit, fuel supply system, lubrication and cooling system of automobiles 3. Understand the working of transmission system, steering and braking system, Electric systems of automobiles 4. Identify and rectify the problems in various systems of automobiles 5. Develop strong base for understanding of future development in automobile industry. 6. Explain working principle of various parts of automobile electrical system and norms of Vehicle Maintenance
<p>Production Planning & Control (DEPE-14914)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Use and compare various statistical forecasting models. 2. Use and analyze of inventory models for independent and dependent demand. 3. Application of various Materials Requirement Planning models. 4. Apply and evaluate the scheduling and sequencing methodologies. 5. Design integrated operations management and production/inventory control systems that include people, materials, information, product design, business strategies. 6. Manage store room operations and understand the purchase procedure for an organization.
<p>Jigs, Fixtures & Tool Design (DEPE-14915)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Implement the tool design process when designing tooling for the manufacturing of a product. 2. Design and develop work holders, jigs and fixtures to manufacture products. 3. Design the various elements of dies for press working operations. 4. Understand the press working operations, design the strip layout and various elements of dies, design the blank development for bending, forming and drawing operations. 5. Explain the principles of economics of jigs and fixtures. 6. Classify different types of jigs and fixtures.
<p>Industrial Safety & Environment (DEPE-14916)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Design the system component or process to meet desired needs with in realistic constraints such as Economic, Health, Safety and Sustainability. 2. Plan and organize the basic industrial activities. 3. Explain standard workplace hazard/warning signs and labels. 4. Maintain thermal stability as well as ventilation in industry 5. Maintain the standards relating to lighting and colour. 6. Explain the standard categories of noise and vibrations.

Mechatronics (DEPE-14917)	<p>Students will be able to:</p> <ol style="list-style-type: none">1. Identification of key elements of mechatronics system and its representation in terms of block diagram2. Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.3. Develop an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.4. Understand stages in designing mechatronic system.5. Explain the working of various mechatronic systems (automatic car parking system, pick & place robot, engine management system)6. Learn about the microprocessors and relays used in mechatronic system.
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GROUP-III (ELECTIVES)

Subject	Course outcomes
Maintenance & Reliability Engineering (DEPE-14918)	<p>Students will be able to:</p> <ol style="list-style-type: none">1. Ability to apply knowledge of mathematics, statistics, basic sciences, and engineering to work professionally in industrial systems.2. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.3. Understand the maintenance function and its objectives and know how to prepare report about the maintenance function4. Ability to identify design problems, to design a system, component or process reliability, quality, environment, health and safety, ethics and society.5. To meet desired needs that may include issues related to manufacturability,6. Ability to effectively communicate orally and in writing.
Quality Assurance and Reliability (DEPE-14919)	<p>Students will be able to:</p> <ol style="list-style-type: none">1. Made aware about the significance of Quality and hierarchy of Quality Management: Inspection & Test, Quality Control, Quality Assurance and Total Quality Management.2. Get acquainted with the concepts of Quality Assurance in detail, including Quality Management Systems such as ISO 9000 series of quality standard and its objectives.3. Learn to use several Quality Improvement Tools like Histogram, charts, Brain Storming exercise, Cause & Effect Diagram & Pareto Diagram.4. Understand the concepts of reliability and maintainability5. Know about elements of probability and concept of reliability engineering including failure data analysis.6. Acquire basic knowledge of total quality management

<p style="text-align: center;">Total Quality Management (DEPE-14920)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. To realize the importance of significance of quality 2. Manage quality improvement teams 3. Identify requirements of quality improvement programs 4. The student manager will be able to explain the concept of Six Sigma its DMAIC process. 5. The student manager will be able to differentiate between common and special cause of variation and/ or differentiate between attributes and variables and/ or construct and write formulae for control charts for variables and attributes. 6. Given a product or a service type, the student manager will be able to enumerate and justify the dimensions of product quality or service quality for the same.
<p style="text-align: center;">Material Management (DEPE-14921)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Identifying the scope for integrating materials management function over the logistics and supply chain operations. 2. Integrate the organization wide materials requirement to develop an overall plan (MRP). 3. Identify, study, compare, and evaluate alternatives, select and relate with a good supplier. 4. Apply various purchasing method and inventory controlling techniques into practice. 5. Analyzing the materials in storage, handling, packaging, shipping distributing and standardizing. 6. Integrate important materials functions to both products and services & use MRP,ERP,& PLM managing materials.

<p>Project Management (DEPE-14922)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Understand project characteristics and various stages of a project. 2. Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic. 3. Analyze the learning and understand techniques for Project planning, scheduling and Execution Control. 4. Apply the risk management plan and analyse the role of stakeholders. 5. Understand the contract management, Project Procurement, Service level Agreements and productivity. 6. Understand the How Subcontract Administration and Control are practiced in the Industry.
<p>Investment Planning (DEPE-14923)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Ability to plan and budget effectively. 2. Recognize the need to adapt financial planning to changing personal needs as well as changes in the economy and financial environment. 3. Effectively analyze the comparative merits of buying and renting a home; tax implications; buying, selling, and leasing fundamentals. 4. Examine investment strategies considering asset allocation 5. Evaluate the various types of insurance and relate this information to personal needs. 6. Evaluate various types of credit; understand costs and how to utilize them to the best advantage.
<p>Entrepreneurship (DEPE-14924)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Analyze the business environment in order to identify business opportunities. 2. Identify the elements of success of entrepreneurial ventures. 3. Consider the legal and financial conditions for starting a business venture. 4. Evaluate the effectiveness of different entrepreneurial strategies. 5. Specify the basic performance indicators of entrepreneurial activity. 6. Explain the importance of marketing and management in small businesses venture.

<p style="text-align: center;">Inspection and Quality Control (DEPE-14925)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Identify and analyze the functions and organization of industrial inspection. 2. Apply and analyze the seven Ishikawa's tools and conduct quality cost analysis. 3. Analyze various control charts for quality control of the different production processes 4. Evaluate through process capability studies if a given process is proficient in meeting customer's specifications 5. Apply the basic concepts involved in the working of instruments for line and angle measurements. 6. Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement
<p style="text-align: center;">CAD & Computer Graphics (DEPE-14926)</p>	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics. 2. Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations. 3. Explain fundamental and advanced features of CNC machines. 4. Illustrate Group Technology, CAQC and CIM concepts. 5. Create the different solid primitives using the different representation schemes. 6. Apply geometric transformations on the created wireframe, surface and solid models.

GROUP-IV (OPEN ELECTIVES)

Subject	Course outcomes
Operation Management (OEPE-14601)	Students will be able to: <ol style="list-style-type: none"><li data-bbox="676 264 1401 331">1. Describe the concept of operations management and productivity.<li data-bbox="676 338 1321 405">2. Evaluate and rank capacity locations, plan and schedule production by solving the problems<li data-bbox="676 412 1433 479">3. Describe MRP & CRP concepts, inventory types and its objectives and calculate EOQ using various models.<li data-bbox="676 486 1326 553">4. Apply the decision models to various real time problems.<li data-bbox="676 560 1433 627">5. Solve and analyze problems using different forecasting techniques.<li data-bbox="676 633 1362 663">6. Summarize the concepts of purchasing and SCM.
Operation Research (OEPE-14602)	Students will be able to: <ol style="list-style-type: none"><li data-bbox="676 707 1401 775">1. Analyze any real-life system with limited constrains and depict it in a model form.<li data-bbox="676 781 1326 810">2. Convert the problem into mathematical model.<li data-bbox="676 817 1283 884">3. Understand the variety of problems such as assignment, transportation etc.<li data-bbox="676 891 1433 958">4. Understand the different queuing situations & find the optimal solutions using models for different situations.<li data-bbox="676 965 1369 1032">5. Simulate different real-life probabilistic situations using monte Carlo simulation technique.<li data-bbox="676 1039 1394 1128">6. Abstracting the essential elements so that a solution relevant to the decision maker's objective can be sought.